

Ref. 2

Japanese Laid-open Publication No. 11-103264

(Translation)

(11) Japanese Laid-open Publication No. 11-103264

(43) Publication Date: April 13, 1999

(21) Patent Application No. 9-279524

(22) Filing Date: September 27, 1997

(72) Inventor: Yoshio ONDA

(71) Applicant: Nippon Boldwin K.K.

#### SPECIFICATION

(54) [Title of the Invention] SPECIFIED LOW POWER RADIO DEVICE

HAVING INTERRUPTION FUNCTION

(57) [Abstract]

[Objective] Providing a specified low power radio device having functions of interrupting a caller and notifying an external alarm to a user who is engaged with a call.

[Solution] A specified low power radio device for calling between portable radio devices 2 via an exclusive relay device 1, wherein the exclusive relay device includes an exclusive relay section 3 for relaying communication between portable radio devices, an interrupt relay section 4 for receiving an interruption signal sent from the portable radio device, an alarm signal and interrupt input section 5 for selecting the external alarm signal and the interruption signal to transmit them to the exclusive relay section. The portable radio device

## SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

has a call channel and a non-call channel, and sends the interruption signal via the non-call channel by pressing the interrupt button (**Fit-10**). An interrupt action during call transmission is performed based on the interruption signal received via the non-call channel, for example, the slave device #1 is forcibly switched from a transmission to a reception, or a transmission is stopped. When the external alarm signal is input in an alarm signal and interrupt input section, the notification action of the external alarm via the non-call channel of the slave device is performed.

SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

[Claims]

[Claim 1] A specified low power radio device comprising:

a transmitter/receiver having a call channel and a non-call channel;

an interruption signal generator for generating an interruption signal;

an interrupt instruction section having interrupt operation means to be operated by a user, for instructing the transmitter/receiver to transmit an interruption signal via the non-call channel using an operation of the interrupt operation means;

an interrupt controller for performing an interrupt action during transmission performed by the call channel based on the interruption signal received via the non-call channel in the transmitter/receiver; and

an input/output section for performing an input-output processing of the call.

[Claim 2] A specified low power radio device comprising:

a transmitter/receiver having a call channel and a non-call channel;

an alarm signal input section for obtaining an external alarm signal transmitted from outside via the non-call channel;

a notification signal generator for generating a notification signal;

# SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

a notification controller for controlling the notification signal generator based on the external alarm signal obtained by the alarm signal input section and performing a notification operation of the external alarm signal; and

an input/output section for performing an input/output processing of the call and an output processing of the notification signal.

[Claim 3] A specified low power radio device comprising:

a transmitter/receiver having a call channel and a non-call channel;

an interruption signal generator for generating an interruption signal;

an interrupt instruction section having interrupt operation means operated by a user, for instructing the transmitter/receiver to transmit an interruption signal via the non-call channel using an operation of the interrupt operation means;

an interrupt controller for performing an interrupt action during transmission performed through the call channel based on the interruption signal received via the non-call channel in the transmitter/receiver; and

an alarm signal input section for obtaining an external alarm signal transmitted from outside via the non-call channel;

a notification signal generator for generating a

# SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

notification signal;

a notification controller for controlling the notification signal generator based on the external alarm signal obtained by the alarm signal input section and performing a notification operation of the external alarm; and

an input/output section for performing an input-output processing of the call and an output processing of the notification signal.

[Claim 4] A specified low power radio device comprising a portable radio device carried by a user and an exclusive relay device, wherein the portable radio device comprises: a transmitter/receiver having a call channel and a non-call channel; an interruption signal generator for generating an interruption signal; an interrupt instruction section having an interrupt operation means operated by a user, for instructing the transmitter/receiver to transmit an interruption signal via the non-call channel using an operation of the interrupt operation means; an interrupt controller for performing an interrupt action during transmission performed through the call channel based on the interruption signal received via the non-call channel in the transmitter/receiver; and an input/output section for performing an input-output processing of the call, wherein

the exclusive relay device has a function of relaying

# SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

communication between the portable radio devices, and a function of receiving the interruption signal transmitted from the portable radio device and transmitting the interruption signal to the portable radio device other than a band radio device.

[Claim 5] A specified low power radio device comprising a portable radio device carried by a user and an exclusive relay device, wherein the portable radio device comprises: a transmitter/receiver having a call channel and a non-call channel; an alarm signal input section for obtaining an external alarm signal transmitted from outside via the non-call channel; a notification signal generator for generating a notification signal; a notification controller for controlling the notification signal generator based on the external alarm signal obtained by the alarm signal input section and performing a notification operation of the external alarm signal; and an input/output section for performing an input/output processing of the call and an output processing of the notification signal, the exclusive relay device has a function of relaying communication between the portable radio devices, and a function of transmitting the external alarm signal transmitted from outside.

[Claim 6] A specified low power radio device comprising a portable radio device carried by a user and an exclusive relay

SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

device, wherein the portable radio device comprises: a transmitter/receiver having a call channel and a non-call channel; an interruption signal generator for generating an interruption signal; an interrupt instruction section having interrupt operation means operated by a user for instructing the transmitter/receiver to transmit an interruption signal via the non-call channel using an operation of the interrupt operation means; and an interrupt controller for performing an interrupt action during transmission performed through the call channel based on the interruption signal received via the non-call channel in the transmitter/receiver, and further comprises

an alarm signal input section for obtaining an external alarm signal transmitted from outside via the non-call channel; a notification signal generator for generating a notification signal; a notification controller for controlling the notification signal generator based on the external alarm signal obtained by the alarm signal input section and performing a notification operation of the external alarm; and an input/output section for performing an input/output processing of the call and an output processing of the notification signal, wherein

the exclusive relay device comprises an exclusive relay section for relaying communication between the portable radio

SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

devices; an interrupt relay section for receiving an interruption signal transmitted from the portable radio device; and an alarm signal and an interrupt input section for selecting the external alarm signal and interruption signal and transmitting them to the exclusive relay section.

[Claim 7] The specified low power radio device according to any one of Claims 1, 3, 4 and 6, wherein the interrupt action of the interrupt controller is a function of stopping a transmission.

[Claim 8] The specified low power radio device according to any one of Claims 1, 3, 4 and 6, wherein the interrupt action of the interrupt controller is a function of forcibly switching from a transmission to a reception.

[Claim 9] The specified low power radio device according to any one of Claims 1, 3, 4, and 6, wherein the interrupt action of the interrupt controller is a function of notifying an occurrence of an interruption.

[Claim 10] The specified low power radio device according to Claim 2 or 5, wherein the external alarm signal indicates an external alarm signal from a device operating in a work site or at a periphery thereof, and these signals, independently or a plurality of signals collectively, are transmitted to a user currently receiving on the portable radio device.

[Claim 11] The specified low power radio device according to

SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

Claim 5, wherein the alarm signal input section has a function of converting the external alarm signal to a signal to be input to the exclusive relay section.

[Claim 12] The specified low power radio device according to Claim 6, wherein the alarm signal and interrupt input section has a function of receiving an interruption signal from a slave device and converting the signal to a signal to be input to the exclusive relay section, and a function of converting the external alarm signal to a signal to be input to the exclusive relay device.

[Claim 13] The specified low power radio device according to any one of Claims 1, 3, 4, and 6, wherein the interruption signal uses the non-call channels of channels 10 to 18 by associating them with the call channels of channels 1 to 9 to be used for an ordinary conversation.

[Claim 14] The specified low power radio device according to any one of Claims 1, 3, 4, and 6, wherein the interrupt operation means are connected to a body of the a portable radio device or an external connection terminal of the portable radio device, or provided on a side of earphones connected to the external connection terminal.

[Claim 15] The specified low power radio device according to any one of Claims 1, 3, 4, 6, and 13, wherein the portable radio device is configured as a headset.

# SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

[The Detailed Description of the Invention]

[0001]

[Field of the Invention]

The present invention relates to, in a work site where a specified low power radio device including only a portable radio device or a specified low power radio device including a portable radio device and an exclusive relay device is used, a specified low power radio device capable of avoiding a problem or a risk that will occur while a user is engaged in a call, by adding a function for notifying an urgent interruption or an input of an alarm signal from a device operating at the work site or at the periphery thereof and other signal.

[0002]

[Prior Art and the Problem Thereof]

A license for using a specified low power radio device is not required, and in this respect, the specified low power radio device has some easiness to use, however, a message transmission or an emergency contact could not be made to a person who is engaged with a call (transmitting) from a recipient, similarly to a conventional transceiver. Although the transceiver has both transmitter/receiver, it is ordinarily set to receive mode, and a transmission button is pressed (a reception is switched to a transmission inside) when desiring a call, namely a transmission, and a call is made. However,

# SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

in this case, even if a transmission attempt is sent from the recipient notifying an emergency, the "transmission" of a first transmitter's slave device is kept (unless a call is terminated to stop the transmission) and could not recognize other person's call. This may possibly cause serious accidents for risky occasions or in case of an emergency, which was a problem from a safety management point of view. The objective of the present invention is to provide a specified low power radio device having a function capable of interrupting a caller (during a transmission). An alternative objective of the present invention is to provide a specified low power radio device having a function for notifying a user, who is engaged with a call, of an alarm from an external device or other alarms.

[0003]

## [Means for Solving the Problems]

In order to achieve the above objective, a specified low power radio device according to a first aspect of the present invention includes a transmitter/receiver having a call channel and a non-call channel; an interruption signal generator for generating an interruption signal; an interrupt instruction section having interrupt operation means to be operated by a user, for instructing the transmitter/receiver to transmit an interruption signal via the non-call channel using an operation of the interrupt operation means; an interrupt controller for

# SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

performing an interrupt action during transmission performed through the call channel based on the interruption signal received via the non-call channel in the transmitter/receiver; and an input/output section for performing an input-output processing of the call.

[0004]

A specified low power radio device according to a second aspect of the present invention includes a transmitter/receiver having a call channel and a non-call channel; an alarm signal input section for obtaining an external alarm signal transmitted from outside via the non-call channel; a notification signal generator for generating a notification signal; a notification controller for controlling the notification signal generator based on the external alarm signal obtained by the alarm signal input section and performing a notification operation of the external alarm signal; and an input/output section for performing an input/output processing of the call and an output processing of the notification signal.

[0005]

A specified low power radio device according to a third aspect of the present invention includes a transmitter/receiver having a call channel and a non-call channel; an interruption signal generator for generating an interruption signal; an interrupt instruction section having interrupt operation means

# SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

operated by a user, for instructing the transmitter/receiver to transmit an interruption signal via the non-call channel using an operation of the interrupt operation means; an interrupt controller for performing an interrupt action during transmission performed through the call channel based on the interruption signal received via the non-call channel in the transmitter/receiver; and an alarm signal input section for obtaining an external alarm signal transmitted from outside via the non-call channel; a notification signal generator for generating a notification signal; a notification controller for controlling the notification signal generator based on the external alarm signal obtained by the alarm signal input section and performing a notification operation of the external alarm; and an input/output section for performing an input-output processing of the call and an output processing of the notification signal.

[0006]

A specified low power radio device according to a fourth aspect of the present invention includes a portable radio device carried by a user and an exclusive relay device, wherein the portable radio device includes a transmitter/receiver having a call channel and a non-call channel; an interruption signal generator for generating an interruption signal; an interrupt instruction section having an interrupt operation means

# SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

operated by a user, for instructing the transmitter/receiver to transmit an interruption signal via the non-call channel using an operation of the interrupt operation means; an interrupt controller for performing an interrupt action during transmission performed through the call channel based on the interruption signal received via the non-call channel in the transmitter/receiver; and an input/output section for performing an input-output processing of the call, wherein

the exclusive relay device has a function of relaying communication between the portable radio devices, and a function of receiving the interruption signal transmitted from the portable radio device and transmitting the interruption signal.

[0007]

A specified low power radio device according to a fifth aspect of the present invention includes a portable radio device carried by a user and an exclusive relay device, wherein the portable radio device includes a transmitter/receiver having a call channel and a non-call channel; an alarm signal input section for obtaining an external alarm signal transmitted from outside via the non-call channel; a notification signal generator for generating a notification signal; a notification controller for controlling the notification signal generator based on the external alarm signal obtained by the alarm signal

# SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

input section and performing a notification operation of the external alarm; and an input/output section for performing an input/output processing of the call and an output processing of the notification signal,

the exclusive relay device has a function of relaying communication between the portable radio devices, and a function of transmitting the external alarm signal transmitted from outside.

[0008]

A specified low power radio device according to a sixth aspect of the present invention includes a portable radio device carried by a user and an exclusive relay device, wherein the portable radio device includes a transmitter/receiver having a call channel and a non-call channel; an interruption signal generator for generating an interruption signal; an interrupt instruction section having interrupt operation means operated by a user for instructing the transmitter/receiver to transmit an interruption signal via the non-call channel using an operation of the interrupt operation means; and an interrupt controller for performing an interrupt action during transmission performed through the call channel based on the interruption signal received via the non-call channel in the transmitter/receiver; an alarm signal input section for obtaining an external alarm signal transmitted from outside via

# SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

the non-call channel; a notification signal generator for generating a notification signal; a notification controller for controlling the notification signal generator based on the external alarm signal obtained by the alarm signal input section and performing a notification operation of the external alarm; and an input/output section for performing an input/output processing of the call and an output processing of the notification signal, wherein

the exclusive relay device includes an exclusive relay section for relaying communication between the portable radio devices, an interrupt relay section for receiving an interruption signal transmitted from the portable radio device, and an alarm signal and an interrupt input section for selecting the external alarm signal and interruption signal and transmitting them to the exclusive relay section.

[0009]

In addition, other aspects of the present invention related to the first to sixth aspects of the present invention have the following configurations.

- (1) The interrupt action of the interrupt controller is a function of stopping a transmission.
- (2) The interrupt action of the interrupt controller is a function of forcibly switching from a transmission to a reception.

# SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

- (3) The interrupt action of the interrupt controller is a function of notifying an occurrence of an interruption.
- (4) The external alarm signal indicates an external alarm signal from a device operating in a work site or at the periphery thereof, and these signals independently or a plurality of signals collectively are transmitted to a user currently receiving on the portable radio device.
- (5) The alarm signal input section has a function of converting the external alarm signal to a signal to be input to the exclusive relay section.
- (6) The alarm signal and interrupt input section has a function of receiving an interruption signal from a slave device and converting it to a signal to be inputted in to the exclusive relay section, and a function of converting the external alarm signal to a signal to be inputted in to the exclusive relay device.
- (7) The interruption signal uses the non-call channels of channel 10 to channel 18 by associating them with the call channels of channel 1 to channel 9 to be used for an ordinary conversation.
- (8) The interrupt operation means are connected to a body of the portable radio device or an external connection terminal of the portable radio device, or provided on a side of earphones connected to the external connection terminal.

# SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

(9) The portable radio device is configured as a headset.

[0010]

[Operation and Effects of the Invention]

It is made possible to interrupt a caller (during transmission) of a specific low power radio device and to notify a caller and a recipient of all the specific low power radio devices of an alarm using an external alarm signal, thus enabling it to notify the person of an emergency or an interruption when a risk that will strike from unforeseen part from a caller or a recipient occurs, in order to continue the call at ease. Therefore, a problem concerning a safety management is solved, and the safety management and the operating effectiveness of a user are improved.

[0011]

[Best Mode for Carrying Out the Invention]

An embodiment of the present invention will be described, with reference to accompanying drawings. A specified low power radio device according to the present invention is configured such that a call made only between portable radio devices carried by a user, or a call made by combining the portable radio device and the exclusive relay device via an exclusive relay device are provided.

[0012]

A portable radio device may be configured by a device

# SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

called a headset. A headset consists of an ear muff for entirely covering the ear when using, an ear plug inserted into an orifice of the ear when using, and a communication section to be attached to a human body or a periphery thereof and carried. The communication section includes speech input/output means including a microphone, a speaker and the like, and a transmission/receiving section performing a signal processing required for a call.

[0013]

The specified low power radio device of the present invention is a system for communicating by voice using a sound among specified low power radios stipulated in Article 6 of Implementing Rule of Radio Law. Especially, channel 10 to channel 18 of the specified lower power radio device are used for an interruption signal and the channel 10 to channel 18 are used by associating them with channel 1 to channel 9 used for an ordinary conversation.

[0014]

Fig. 1 shows a configuration of a first embodiment of the present invention, and a portable radio device as a specified low power radio device includes a transmitter/receiver 10, an interruption signal generator 11, an interrupt instruction section 12, an interrupt controller 13, an input/output section 14, and a power supply unit 15. The transmitter/receiver 10

# SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

performs a processing of radio transmission of a speech input signal via a call channel to other portable radio device, converting a signal received from the other portable radio device via the call channel to a speech output signal to send it to the input/output section 14, and transmitting/receiving the interruption signal via a non-call channel.

[0015]

The interrupt instruction section 12 includes an interrupt button for requesting an interruption during a call, and directs the transmitter/receiver 10 to transmit the interruption signal based on an interrupt switch signal generated by pressing the interrupt button. The interruption signal generator 11 generates the interruption signal at a request of the interrupt instruction section 12. An interrupt switch is operated by pressing the interrupt button, and then the transmitter/receiver 10 modulates the interruption signal at a frequency of channels (channel 10 to channel 18) assigned to the non-call channel to send it to other portable radio device under an instruction of the interrupt instruction section 12. Here, the interrupt button constitutes an interrupt operation means 16 to be operated by a user. The interrupt button is directly connected to an external connection terminal that is provided on a body of the portable radio device or the portable radio device, or is alternatively provided on a side of the

# SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

earphones connected to the external connection terminal. As another configuration of the interrupt button, it may be provided for a headset.

[0016]

The interrupt controller 13 performs an interrupt action for the transmitter/receiver 10 or the input/output section 14 based on the interruption signal from other portable radio device that was received by the transmitter/receiver 10. The interrupt action performed by the interrupt controller will be described. A first interrupt action notifies that the interruption occurred through a speaker, earphones and the like, using an alarm tone corresponding to the received interruption signal. In this case, a call is continued. However, it is possible to configure such that a call is suspended during which the interruption is notified, and the call then is resumed, or alternatively the interrupt notification is included in a call. A second interrupt action forcibly switches the portable radio device to a receive mode when the interruption signal is input in the portable radio device which is transmitting, and notifies that the interruption has occurred. A third interrupt action makes the portable radio device stop a transmission when the interruption signal is input in the portable radio device which is transmitting, and notifies that the interruption has occurred. In order to realize these interrupt actions, the

# SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

interrupt controller incorporates an interrupt control program, and any of the first to third interrupt actions may be performed by the settings. Alternatively, it may also be configured such that one of the first to third interrupt actions is set as a standard specification (default) in advance, the setting may be converted to other interrupt action on user side.

[0017]

The input/output section 14 includes speech input/output means 17 such as a microphone and a speaker, and processes the speech input and speech output. The speech input/output means 17 is configured by a microphone and a speaker incorporated in the portable radio device body and/or earphones and a microphone connected to an external connection terminal.

[0018]

Fig .2 shows a configuration of a specified low power radio device with an additional function of notifying a portable radio device during a call of an external alarm by inputting an external alarm signal. The portable radio device as the specified low power radio device includes a transmitter/receiver 20, an alarm signal input section 21, a notification signal generator 22, a notification controller 23, an input/output section 24, and a power supply unit 25. Here, as the input/output section 24 has a substantially same function as that disclosed in an embodiment in Fig. 1, a description

# SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

thereof will not be given.

[0019]

The transmitter/receiver 20 performs processing of radio transmission of speech input signal to other portable radio device via a call channel, converts a signal received from the other portable radio device via the call channel to a speech signal to send it to the input/output section 24, and performs processing of an external alarm signal received via a non-call channel.

[0020]

The alarm signal input section 21 recognizes the external alarm signal received by the transmitter/receiver 20 and determines whether it is a registered external alarm signal to obtain the external alarm signal. The notification signal generator 22 generates a notification signal for notifying that the external alarm was issued. The notification controller 23 performs a notification action for the input/output section 24 based on the obtained external alarm signal. In the above-described embodiment, the specified low power radio device in which an interruption function and an external alarm function are separately configured, has been described, however, a specified low power radio device may, of course, be configured by combining an interrupt and an external alarm.

[0021]

# SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

Fig. 3 shows a second embodiment, a system using n portable radio devices 2 configured as a specified low power radio device (hereinafter referred to as "a slave device"), and one exclusive relay device 1, illustrating a normal conversation status where transmission is made (**Ft-1**) from a slave device #1 and received (**Fr-1**) by other slave device. Fig. 4 illustrates the status where in a call status in Fig. 3, an interruption signal is transmitted (**Fit-10**) from a slave device #n and received (**Fir-10**) by the slave device #1 and other slave devices. As a configuration of a system, an interruption function and an external alarm notification function are independently added, respectively, or a combination of the interruption function and external alarm notification function are added. Hereinafter, a system with the interruption function and external alarm notification function will be described. However, also in a case of a system with only the interruption function being added or a system with only the external alarm notification function being added, they may be easily carried out by making a modification in design of the additional functions.

[0022]

An exclusive relay device 1 includes an exclusive relay section 3, an interrupt relay section 4, an alarm signal and interrupt input section 5, and a power supply unit 6 as shown

# SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

in Fig. 3. The exclusive relay section 3 has a function of relaying communication between portable radio devices. That is, the exclusive relay section 3 has a function of relaying communication between slave devices in the same channel and performing communication to each of slave devices 2 based on the interruption signal and external alarm signal. The exclusive relay section 3 includes a transmitter/receiver 30, a frequency converting section 31, a speech circuit section 32, an exclusive relay controller 33 and a power supply unit 61 as shown in Fig. 5.

[0023]

A transmitter/receiver has a function of performing radio transmission processing from each of slave devices to an exclusive relay device or from the exclusive relay device to each of the slave devices. In order to enable a call of a user in a group at a work site with the outside, the frequency converting section 31 and the speech circuit section 32 are provided. The frequency converting section 31 has a function of converting a speech signal to a radio frequency. The speech circuit section 32 has a function of generating different sounds or audios so that respective information of the interruption and alarm may be distinguished. The exclusive relay controller 33 incorporates an exclusive relay control program for the purpose of realizing a function of the exclusive relay section

# SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

3, and controls communication between ordinary slave devices 2 and performs a control for transmitting an interruption or an alarm to each of the slave devices based on the interruption and external alarm signal from the alarm signal and interrupt input section 5.

[0024]

The interrupt relay section 4 includes a receiver 40, an interrupt relay controller 41, and a power supply unit 61 as shown in Fig. 6. The receiver 40 receives the interruption signal from the slave device in the same channel and sends it to the interrupt relay controller 41. The interrupt relay controller 41 has a function of receiving the interruption signal sent from each of the slave devices 2, incorporates the interrupt relay control program for the purpose of realizing the function, recognizes the interruption signal sent from each of the slave devices 2, determines if it is an interruption signal issued from within the same group, and sends the interruption signal of the group to the alarm signal and interrupt input section 5. A reference symbol 60 denotes an AC-DC converter for converting AC to DC.

[0025]

The alarm signal and interrupt input section 5 has a function of selecting the external alarm signal and the interruption signal to transmit the signal to the exclusive

# SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

relay section 3, and includes an input controller 50, an alarm tone converter circuit section 51 and an external input detector 52 as shown in Fig. 7. The input controller 50 determines if an input signal is an interruption/alarm, and depending upon the results thereof, outputs the interruption signal from the alarm signal and an interrupt input section or an external alarm signal generated in the alarm tone converter circuit section 51 to the exclusive relay section 3.

[0026]

The external input detector 52 detects a contact signal (external input signal) sent from an external device 9 located in a work site or at the periphery thereof and inputs the signal in the alarm tone converter circuit section 51. The alarm tone converter circuit section 51 converts the signal based on the contact signal detected in the external input detector 52 to an external alarm signal in which the corresponding alarm contents may be distinguished. The external alarm signal bundles different alarm tones in each contact signal or contact signals, and groups the same alarm tones or a plurality of contact signals to be able to provide a property of having different alarm tones in each group. As for a slave device used in the second embodiment, a configuration shown in Fig. 1 or Fig. 2, or a configuration of a combination of Figs. 1 and 2 is adopted. In the slave device 2 in this example, earphones

# SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

80 and a microphone 81 as speech input/output means 8 are connected to the external connection terminal of the slave device, and an interrupt button as interrupt operation means 7 is provided along a connecting cord. An example in the second embodiment may be configured only by respective function of the interruption function and the external alarm notification function. In this case, this may be realized by providing function addition setting means for setting whether or not an interruption and/or an external alarm notification are used in an input controller of the alarm signal and interrupt input section, and setting the function addition setting means in advance.

[0027]

Using the specified low power radio device of the present invention will be described with reference to a system shown in Fig. 3. In the state shown in Fig. 3, when using a known transceiver and trying to transmit from a slave device other than a slave device #1, it is necessary to wait for the termination of the call using the slave device #1. However, when using the specified low power radio device of the present invention, the interruption signal is sent by pressing the interrupt button from the slave device #n while the slave device #1 is transmitting, and the interruption signal is received in the interrupt relay section as shown in Fig. 4. A signal

# SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

indicating that the interruption signal has been received from the interrupt relay section is input to the alarm and interrupt input section from the input relay section. In the alarm signal and interrupt input section, the alarm tone indicating the occurrence of an interruption signal is generated, and is simultaneously sent to the exclusive relay section. The exclusive relay section modulates the alarm tone to the frequency set in advance and sends the alarm radio wave.

[0028]

The slave device that has received this radio wave receives an instruction for switching to a receive mode and outputs an alarm tone from the speaker or earphones as an output signal. The received alarm tone continues while the interrupt button is pressed in the slave device on a transmitting side. Further the external alarm signal recognizes an external alarm signal generated by other device as a member of the same group and handles the signal in the same manner as that of the interruption signal in order to notify all persons having the slave devices. However, the input section is configured by the interrupt input section and the external alarm signal input section, and transmits the external alarm signal to the slave device by inputting it as a contact signal preferentially.

[0029]

Next, as an application example of the present invention,

# SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

a group use will be described with reference to Fig. 8. In addition, Fig. 8 shows a system constituted of a portable radio device (slave device) and an exclusive relay device, which, however may be applied to a portable radio device only shown in Fig. 1, namely a system not using the exclusive relay device. The specified low power radio device of the present invention may be used by dividing respective channels of channel 1 to channel 9 used for an ordinary conversation into groups, namely 9 groups. That is, the specified low power radio device is provided with a channel selection switch for selecting channels channel 1 to channel 9 and the channel assigned to each group is set on the specified low power radio device carried by a user incorporated into the group.

[0030]

In this way, by setting a channel, no interference with other channels is caused and it is made possible to call among a plurality of slave devices in the same group, and further the interruption signal sent from one slave device in a group is transmitted to other slave device in the same group. An example of use in 9 groups has been described here, however, it is not limited to this configuration and the number of groups may be arbitrarily selected, and the configuration in accordance therewith may be adopted.

[0031]

# SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

An alternative embodiment of the present invention will be described. As an external input, for example, in a printing plant, a system of issuing an alarm is employed if a printing failure is detected in a paper quality device (PQD), or if cutoff of water supply occurs or dampening solution becomes insufficient or water pressure decreases in a spray dampener (SD). It may be carried out by the exclusive relay device detecting these alarms indirectly using light or without wires, or providing each device with a relay contact circuit and directly connecting the circuit to the exclusive relay device in the second embodiment. In addition to the above-described external alarm signal, other alarm signal may be added as an external input. The exclusive relay device is provided with a function of selecting the above-described external input connection with a key input and/or a password input. This function may be carried out by preliminary inputting a key signal and/or a password signal in the input controller and setting a connection of various external alarm signals (acceptance of a contact signal).

[0032]

As an alternative embodiment of the external input detector, using a signal for selecting each external input corresponding to a key input and/or a password input sent from the input controller, the external input accepted by the present

# SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

system is selected and only the specified external input is connected. Namely, in order to prevent the operation end or extreme performance deterioration of the present system caused by a non-standard external input, a lock function for accepting only the external input having a specification determined in advance and an unlocking function for unlocking the lock function are provided. In order to realize these functions, (1) a mechanical key and a switch contact are linked, and a circuit to be connected to an input terminal of the exclusive relay device (a terminal for introducing a signal for an external input to the external input detector) is set as connected or non-connected, and (2) the input of a mechanical key and a password are linked and a circuit is set as connected or non-connected similarly.

## [Brief Description of the Drawings]

Fig. 1 shows a configuration of a first embodiment of a specified low power radio device according to the present invention and is a block diagram of a device having an interruption function.

Fig. 2 shows a configuration of an alternative embodiment of the first embodiment and is a block diagram of a device having an external alarm notification function.

Fig. 3 shows a system of a second embodiment of a specified low power radio device according to the present invention and

# SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

is a configuration diagram when making a normal call.

Fig. 4 is an explanatory view when interrupting.

Fig. 5 is a block diagram of the exclusive relay section.

Fig. 6 is a block diagram of an exclusive relay section.

Fig. 7 is a block diagram of an alarm signal and interrupt input section.

Fig. 8 is an explanatory diagram when used by a plurality of groups.

## [Description of the Reference Symbols]

- 1      Exclusive relay device
- 2      Portable radio device (slave device)
- 3      Exclusive relay section
- 4      Interrupt relay section
- 5      Alarm signal and interrupt input section
- 7      Interrupt operation means (interrupt button)
- 8      Speech input/output means (earphones 80, microphone 81)
- 9      External device

# SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

Fig. 1

- 1 TRANSMITTER/RECEIVER
- 2 INTERRUPTION SIGNAL GENERATOR
- 3 INTERRUPT INSTRUCTION SECTION
- 4 INTERRUPT CONTROLLER
- 5 INPUT/OUTPUT SECTION
- 6 POWER SUPPLY UNIT
- 7 INTERRUPT OPERATION MEANS
- 8 SPEECH INPUT/OUTPUT MEANS

Fig. 2

- 9 EXTERNAL ALARM SIGNAL
- 10 TRANSMITTER/RECEIVER
- 11 ALARM SIGNAL INPUT SECTION
- 12 NOTIFICATION SIGNAL GENERATOR
- 13 NOTIFICATION CONTROLLER
- 14 INPUT/OUTPUT SECTION
- 15 POWER SUPPLY UNIT
- 16 SPEECH INPUT/OUTPUT MEANS

Fig. 5

- 17 EXCLUSIVE RELAY SECTION
- 18 TRANSMITTER/RECEIVER
- 19 FREQUENCY CONVERTING SECTION

SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

- 20 SPEECH CIRCUIT SECTION
- 21 EXCLUSIVE RELAY CONTROLLER
- 22 INTERRUPTION SIGNAL AND EXTERNAL ALARM SIGNAL
- 23 POWER SUPPLY UNIT

Fig. 6

- 24 INTERRUPT RELAY SECTION
- 25 RECEIVER
- 26 INTERRUPT RELAY CONTROLLER
- 27 POWER SUPPLY UNIT
- 28 INTERRUPTION SIGNAL

Fig. 3

- 1 SLAVE DEVICE #1
- 2 SLAVE DEVICE #2
- 3 SLAVE DEVICE #n
- 4 EXCLUSIVE RELAY DEVICE
- 5 EXCLUSIVE RELAY SECTION
- 6 ALARM SIGNAL AND INTERRUPT INPUT SECTION
- 7 EXTERNAL ALARM SIGNAL
- 8 INTERRUPT RELAY SECTION
- 9 DC SUPPLY
- 10 POWER SUPPLY UNIT
- 11 AC POWER SUPPLY

SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

Fig. 4

- 12 SLAVE DEVICE #1
- 13 SLAVE DEVICE #2
- 14 SLAVE DEVICE #n
- 15 EXCLUSIVE RELAY DEVICE
- 16 EXCLUSIVE RELAY SECTION
- 17 ALARM SIGNAL AND INTERRUPT INPUT SECTION
- 18 EXTERNAL RELAY SECTION
- 19 INTERRUPT RELAY SECTION
- 20 DC SUPPLY
- 21 POWER SUPPLY UNIT
- 22 AC POWER SUPPLY

Fig. 7

- 23 INTERRUPTION SIGNAL
- 24 ALARM SIGNAL AND INTERRUPT INPUT SECTION
- 25 INPUT CONTROLLER
- 26 ALARM TONE CONVERTER CIRCUIT SECTION
- 27 EXTERNAL ALARM SIGNAL DETECTOR
- 28 EXTERNAL ALARM SIGNAL/INTERRUPTION SIGNAL
- 29 CONTACT SIGNAL
- 30 EXTERNAL DEVICE
- 31 CONTACT SIGNAL

SHUSAKU YAMAMOTO

Japanese Laid-open Publication No. 11-103264

Fig. 8

32 CONFIGURATION IN FIG. 3

33 CHANNEL SETTING 1

THE SAME SETTING TO SLAVE DEVICE AND RELAY DEVICE

34 CONFIGURATION IN FIG. 3

35 CHANNEL SETTING 2

THE SAME SETTING TO SLAVE DEVICE AND RELAY DEVICE

36 CONFIGURATION IN FIG. 3

37 CHANNEL SETTING 9

THE SAME SETTING TO SLAVE DEVICE AND RELAY DEVICE

入力の接続を選択する機能を持たせる。この機能は入力制御部にキー信号および／またはパスワード信号を予め入力し、各種の外部警報信号の接続（接点信号の受付）を設定することで実施できる。

【図1】外部入力検知部の他の実施形態としては入力制御部から送られるキー入力および／またはパスワード入力に対応した各外部入力を選択するための信号により、本システムが受けける外部入力を選別し、特定の外部入力のみを接続する。即ち、規格外の外部入力による本システムの動作停止や著しい性能低下を防止するため、予め定めた仕様の外部入力のみを受けるロック機能とそのロック機能を解除するロック解除機能を持たせる。これらの機能を実現するため、(1)機械的なキーとスイッチの接点を連係し、専用中継機の入力端子（外部入力検知部へ外部入力による信号を取り込むための端子）に接続される回路を接続または非接続に設定する。

(2) 機械的なキーとパスワードの入力を運動し、同様に回路を接続または非接続に設定する。

## 【図面の簡単な説明】

\* 【図1】 本発明に係る特定小電力無線機の第一実施形態の構成を示し、割込み機能を備えた装置のブロック図である。

【図2】 第一実施形態の他の実施例の構成を示し、外部警報通知機能を備えた装置のブロック図である。

【図3】 本発明に係る特定小電力無線機の第二実施形態のシステムを示し、通常通話時の構成図である。

【図4】 割込時の説明図である。

【図5】 専用中継部のブロック図である。

【図6】 割込中継部のブロック図である。

【図7】 警報信号・割込入力部のブロック図である。

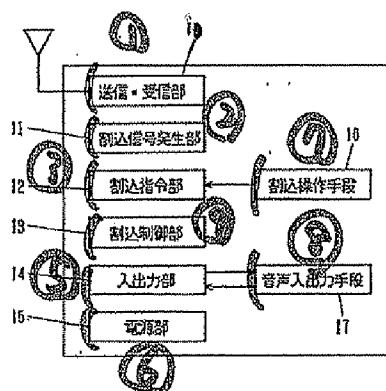
【図8】 複数のグループで使用するときの説明図である。

## 【符号の説明】

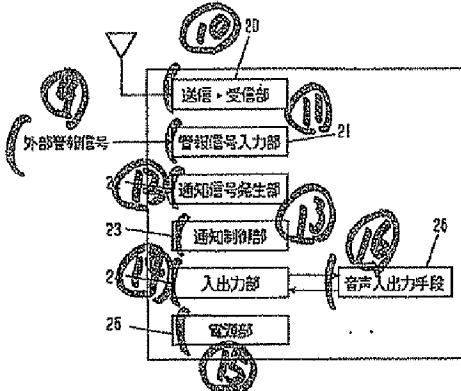
1…専用中継機、2…携帯無線機（子機）、3…専用中継部、4…割込中継部、5…警報信号・割込入力部、7…割込操作手段（割込ボタン）、8…音声入出力手段（イヤホン80、マイクロフォン81）、9…外部機器

\*

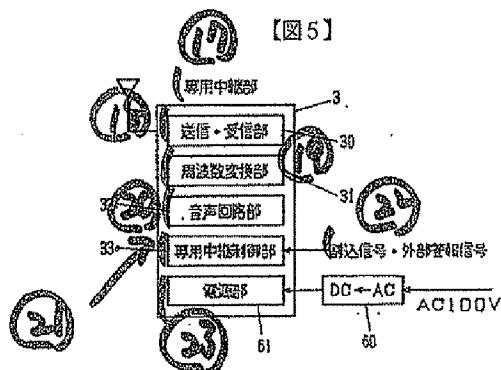
【図1】



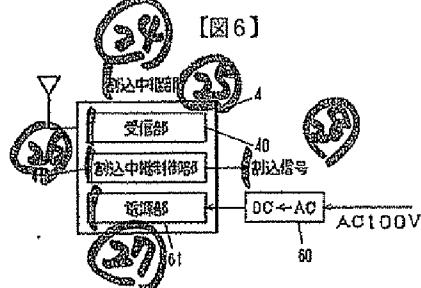
【図2】



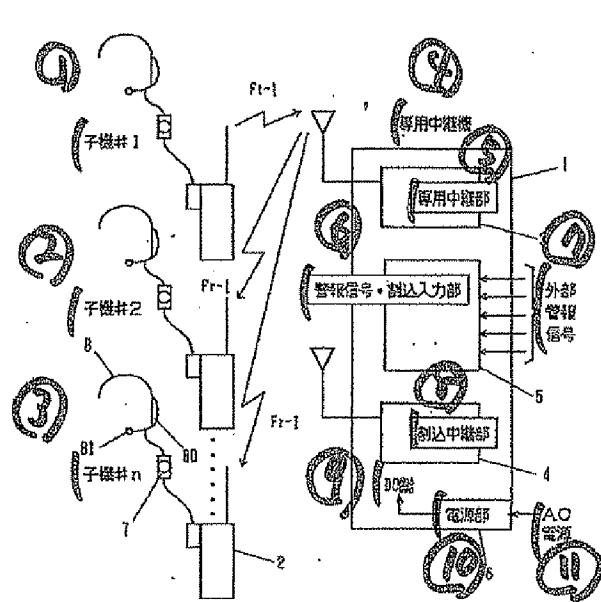
【図5】



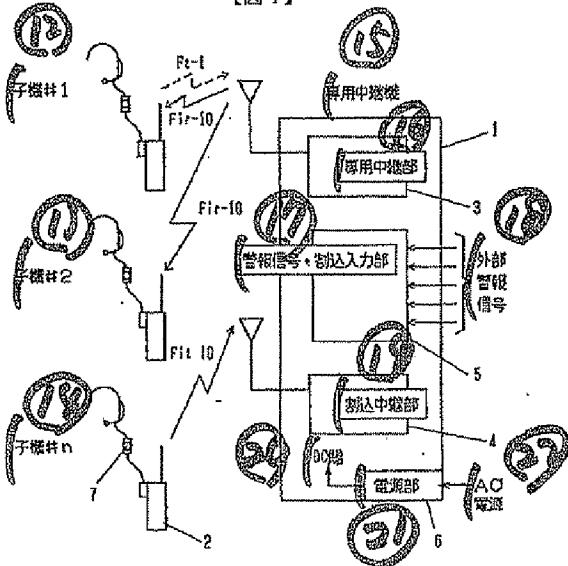
【図6】



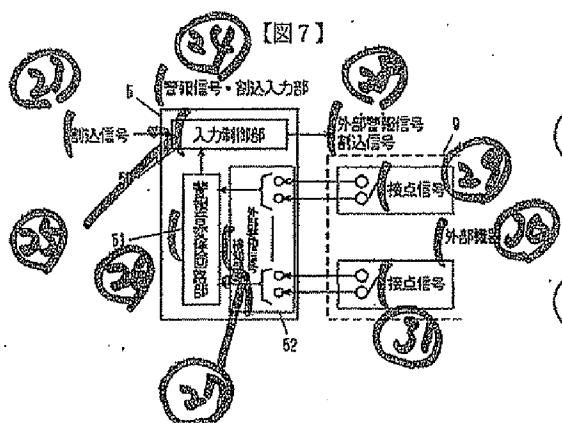
【図3】



【図4】



【図7】



【図8】

